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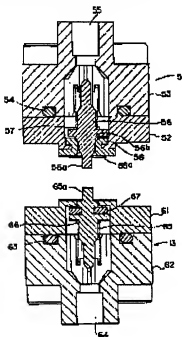
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(54) INK JET RECORDER



(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink jet recorder having a connection mechanism which can prevent leakage of ink under separated state.

SOLUTION: Valve units 51, 13 disposed in a connection mechanism comprise abutting rods 56, 65 disposed in cylinder-like cases 52, 61 while being urged in the projecting direction, and seal members 58, 67 for closing ink supply passage under projecting state of the abutting rods 56, 65. The valve units 51, 13 are connected to cause movement of respective abutting rods 56, 65 and ink can be conducted based on movement of respective abutting rods 56, 65. When it is employed in a recorder arranged to supply ink to a sub-tank mounted on a carriage at an ink supply stage, conventional ink supply tube coupling an ink tank and a sub-tank can be eliminated.

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CLAIMS

[Claim(s)]

[Claim 1] The recording head by which is carried in carriage and both-way actuation is carried out crosswise [of a record form], It is an ink jet type recording device possessing the ink tank which supplies ink to said recording head. On the ink supply way from said ink tank to a recording head, it is constituted possible [attachment and detachment]. The ink jet type recording device which comes to provide the attachment equipped with the bulb unit with which an ink supply way is blocked in both connection in the condition that enabled the negotiation of ink in both connection condition, and both were separated, respectively.

[Claim 2] The ink jet type recording device according to claim 1 which it is carried with a recording head between said ink tanks and recording heads at carriage, the sub tank which supplies ink to said recording head possesses while receiving supply of ink from an ink tank, and comes to arrange said attachment between said ink tanks and sub tanks.

[Claim 3] The ink jet type recording device according to claim 2 constituted so that it might be arranged on the ink supply stage in which one side of said attachment is located near the moving trucking of carriage, another side of said attachment might be carried in a carriage side and carriage might become connectable in both of said attachment in the condition of having been located in the ink supply stage.

[Claim 4] The ink jet type recording device according to claim 1 to 3 constituted so that ***** energized in the direction which be arrange in a cylinder-like case and project mutually to said bulb unit, and the seal member by the flexible raw material with which an ink supply way be blockade in the projection condition of said ***** might possess and the negotiation of ink might be attained based on migration of each ***** by both connection.

[Claim 5] The ink jet type recording device according to claim 4 constituted so that the taper section might be formed in said a part of ***** at least in one side of said bulb unit and the slant face of the taper section might be contacted to said seal member in the projection condition of said *****.

[Claim 6] At least one side of the bulb unit in the projection condition of said ***** is the ink jet type recording device according to claim 4 constituted so that the space between said ***** which results in a connection end-face side, and said cylinder-like case may be in the condition of hardly forming a clearance from said seal member.

[Claim 7] The ink jet type recording device according to claim 4 to 6 which is supported so that ***** within said cylinder-like case can slide on shaft orientations by at least three fin-like members which project in the direction of an axial center of a cylinder-like case, and comes to form ink passage between said each fin-like member.

[Claim 8] It is a written ink jet type recording device in either claim 4 constituted by said seal member to which the seal member by which ***** at least in one side of said bulb unit is contacted extended to the end-face side of a bulb unit at one, and extended to the end-face side in the connection condition of both of a bulb unit so that the seal of the end face of each bulb unit might be carried out thru/or claim 7.

[Claim 9] The ink jet type recording device according to claim 4 constituted so that each ***** in both of a bulb unit might move and the negotiation of ink might be attained, after a seal was carried out between the open air by the seal member which the seal member has been arranged at the connection end face at least in one side of said bulb unit, and has been arranged in the condition of connecting both of a bulb unit at said connection end face.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink jet type recording device which has arranged the attachment arranged possible [attachment and detachment] on the ink supply way from an ink tank especially to a recording head about the ink jet type recording device possessing the recording head by which is carried in carriage and both-way actuation is carried out crosswise [of a record form], and the ink tank which supplies ink to said recording head.

[0002]

[Description of the Prior Art] An ink jet type recording device has the comparatively small noise at the time of printing, and since it can form a dot small moreover by the high consistency, it is used for many printings which include color printing in these days. Record is performed by making an ink droplet breathe out to a record form, having the ink jet type recording head which such an ink jet type recording apparatus is generally carried on carriage, and moves crosswise [of a record form], and the paper feed means to which a record form is relatively moved to a recording head, and moving a recording head crosswise [of a record form] on carriage.

[0003] And on common carriage, the recording head for blacks which carries out the regurgitation for example, of the black ink, and yellow, cyanogen and the recording head for colors in which the regurgitation of each ink of a Magenta is possible are carried, and full color printing is enabled by changing the regurgitation rate of not only the text print in black ink but each ink.

[0004] On the other hand, in order to make it correspond to printing of a large quantity comparatively in this kind with which for example, for office or business use is provided of recording device, the recording device of a format with which the wearing equipment (cartridge holder) which will need to arrange a mass ink cartridge, for this reason has arranged the ink tank as an ink cartridge to the flank of for example, the body of equipment is made to load is offered. And it is constituted so that a subtank may be arranged, ink may be supplied from said ink tank through an ink supply tube to each subtank and ink may be further supplied from each subtank to a recording head, respectively on the carriage with which the recording head was carried.

[0005]

[Problem(s) to be Solved by the Invention] By the way, in a recording apparatus which was described above, in order to supply ink to each subtank from each ink tank, each ink is made to correspond, the ink supply tube is connected, and it has the problem that where of this ink supply tube gives resistance to migration of carriage, in the recording apparatus with a long scan distance which prints to the large-sized space demanded especially in these days.

[0006] Then, when the above mentioned ink supply tube is eliminated and the ink residue in a subtank decreases, carriage moves to an ink supply stage and the recording device of the format which supplies ink from each ink tank to each subtank by making the inside of a subtank decompress through attachment in the part concerned is proposed in this applicant. In this case, the need of arranging the attachment for supplying ink between an ink supply stage and a subtank side possible [attachment and detachment] arises.

[0007] This invention is made based on such a technical background, and is set to said attachment. With constituting so that an ink supply way may be blockaded in both connection in the condition that enabled the negotiation of ink in both connection condition, and both were separated, respectively While preventing a break through of the ink at the time of connectionless, it aims at offering the ink jet type recording device the closure condition enabled it to hold also to a subtank side.

[0008]

[Means for Solving the Problem] The basic configuration of the ink jet type recording device concerning this invention made in order to attain the above mentioned object The recording head by which is carried in carriage and both-way actuation is carried out crosswise [of a record form], It is an ink jet type recording device possessing the ink tank which supplies ink to said recording head. On the ink supply way from said ink tank to a recording head, it is constituted possible [attachment and detachment]. The negotiation of ink is enabled in both connection condition, and the attachment equipped with the bulb unit with which an ink supply way is blockaded in both connection in the condition that both were separated, respectively possesses.

[0009] In this case, between said ink tanks and recording heads, while being carried in carriage with a recording head and receiving supply of ink from an ink tank, it is suitable to adopt it as the recording device possessing the subtank which supplies ink to said recording head.

[0010] Furthermore, it functions on validity more by it being arranged on the ink supply stage in which one side of said attachment is located near the moving trucking of carriage, and another side of said attachment being carried in a carriage side, and adopting it as a recording device with which carriage becomes connectable in both of said attachment in the condition of having been located in the ink supply stage.

[0011] And it is desirable for ***** energized in the direction which is arranged in a cylinder-like case and projects mutually to said bulb unit, and the seal member by the flexible raw material with which an ink supply way is blockaded in the projection condition of said ***** to possess, and to be constituted based on migration of each ***** by both connection, so that the negotiation of ink may be attained.

[0012] In this case, the taper section is formed in said a part of ***** at least in one side of said bulb unit. It is desirable to be constituted so that the slant face of the taper section may be contacted to said seal member in the projection condition of said *****.

Moreover, as for at least one side of the bulb unit in the projection condition of said ***** , it is desirable to be constituted so that the space between said ***** which results in a connection end-face side, and said cylinder-like case may be in the condition of hardly forming a clearance from a seal member.

[0013] Moreover, it is supported so that ***** within said cylinder-like case can slide on shaft orientations by at least three fin-like members which project in the direction of an axial center of a case. It is desirable to constitute so that ink passage may be formed between said each fin-like member. Moreover, the seal member by which ***** at least in one side of said bulb unit is contacted preferably extends to the end-face side of a bulb unit at one. It is constituted by said seal member which extended to the end-face side in the connection condition of both of a bulb unit so that the seal of the end face of each bulb unit may be carried out.

[0014] Furthermore, a seal member is arranged at the connection end face at least in one side, and after a seal is carried out between the open air by the seal member arranged in the condition of connecting both of a bulb unit at said connection end face, the configuration which each ***** in both of a bulb unit moves, and enables the negotiation of ink can also be adopted suitably.

[0015] According to the above configuration, when it is adopted as the recording apparatus constituted so that ink could be supplied to a recording head side through said attachment, it might have especially a subtank and ink might be supplied to a subtank on an ink supply stage, the ink supply tube connected with a subtank from an ink tank like before can be eliminated.

[0016] And since attachment enables the negotiation of ink in both connection condition and it considers as the configuration by which an ink supply way is blockaded in both connection, respectively in the condition that both were separated, while being able to make it prevent that ink leaks out from a connection in both separation condition, it can also be made to prevent that atmospheric air flows backwards from a connection.

[0017]

[Embodiment of the Invention] Hereafter, the ink jet type recording device concerning this invention is explained based on the gestalt of operation shown in drawing. Drawing 1 shows the configuration of the attachment by the side of the subtank in the ink jet type recording apparatus with which this invention was applied, and a subtank with a sectional view. The attachment 2 attached in the subtank 1 and its upper part is carried in carriage with the recording head mentioned later, and it is constituted so that both-way actuation may be carried out crosswise [of a record form (not shown)]. And while receiving supply of ink from an ink tank through said attachment 2, it is constituted so that ink can be supplied to said recording head.

[0018] The subtank 1 shown in the bottom half section of drawing 1 is constituted by case 1a to which opening of the upper part was carried out, and lid 1b which blockades the upper part, and these are combined by means, such as ultrasonic welding or oscillating joining, and it forms ink reservoir room 1c by which the interior was sealed by this. And in this subtank 1, the float member 3 which surfaces in the ink stored in the subtank is arranged. This float member 3 is constituted so that it can carry out movable in the gravity direction up and down by setting the support shaft 4 formed in one at this float member as a rotation core.

[0019] Moreover, by arranging the seal member 5 in the upper part of the subtank 1, and

this seal member's 5 surfacing in the ink with which it filled up into the subtank 1, and contacting the bulb member 6 which constitutes the air valve arranged in the upper part of the subtank 1, it is constituted so that the attraction way which passes to the reduced pressure pump as a negative pressure generating means to mention later can be blocked.

[0020] Moreover, the opening 7 of the ink which receives supply of ink from the ink tank later mentioned through the attachment 2 shown in the subtank 1 at the Johan section is arranged, and the ink feed hopper 8 which supplies ink to the recording head later mentioned through attachment 2 is also arranged by the subtank 1. Furthermore the air induction inlet 9 is arranged in the upper part of the subtank 1, and it is constituted so that air can be introduced from this air induction inlet 9 corresponding to consumption of the ink accompanying printing.

[0021] In addition, although the configuration about one subtank is shown in drawing 1, corresponding to each ink treated, the subtank of the same configuration of plurality (it sets in the gestalt of this operation and they are six pieces) will be put side by side for this to the space top perpendicular direction.

[0022] On the other hand, the common bulb unit 11 connected to a reduced pressure pump side through the attraction space (henceforth attraction opening) 10 which is open for free passage to the bulb member 6 is arranged at attachment 2. Respectively corresponding to each subtank, said attraction space 10 is open for free passage to a space top perpendicular direction across boundaries, and is formed in it, therefore through the common bulb unit 11, the attraction space 10 is constituted so that it can connect with the attachment of the others mentioned later arranged on the ink supply stage. In addition, said bulb unit 11 is constituted so that it may open, when connecting with other attachment arranged on the ink supply stage.

[0023] Moreover, the makeup space 12 which sends in ink in said attachment 2 in the opening 7 of the ink makes each subtank 1 correspond, and is formed according to the individual, and it is constituted so that it can connect with the attachment of the others mentioned later arranged on the ink supply stage through the bulb unit 13 arranged in each makeup space 12. In addition, also in said each bulb unit 13, it is constituted so that it may open, when connecting with other attachment arranged on the ink supply stage.

[0024] On the ink supply way to [from the ink feed hopper 8] a recording head in attachment 2, the ink supply bulb 14 by which closing motion control is carried out makes each subtank correspond, and is arranged according to the individual. Furthermore, although make each subtank correspond and it is arranged according to the individual, and the air installation space 16 through the air installation bulb 15 is open for free passage across boundaries, and is formed and the air installation bulb 15 which counters the above mentioned air induction inlet 9, and is opened and closed in attachment 2 is not shown in drawing 1, a part of air installation space 16 is opened by atmospheric air.

[0025] As the configuration of ink feed hopper 8 part shows between said sub tanks 1 and attachment 2, for example, as the communication trunk 17 which extends to one presses fit in the flexible seal member 19 in a circle arranged at the cavity 18 formed in the attachment 2 side, it is connected to it from the subtank 1 side. This configuration is similarly constituted in the opening of ink 7 above mentioned part, bulb member 6 part, and air induction inlet 9 part.

[0026] And in the gestalt of operation shown in drawing 1, the projection 20 which protruded on one side attachment wall of the subtank 1 enters into the engagement hole 21 formed in attachment 2, and on the other hand, as the engagement pawl 23 formed in attachment 2 gets over to the projection 22 formed in the side attachment wall of another side of the subtank 1, both are combined with it by one.

[0027] Drawing 2 shows the basic configuration of one ink supply system which supplies ink to a recording head through the above mentioned subtank from the ink cartridge as an ink tank by the mimetic diagram. In addition, in drawing 2, the attachment 2 by the side of the subtank shown in drawing 1 and the attachment in the ink supply stage which is connected to this attachment and which is mentioned later are omitted and shown.

[0028] The sign 31 in drawing 2 shows the ink tank, and the cartridge holder arranged for example, on both the outsides of a recording apparatus is loaded with this ink tank 31.

And it is constituted so that ink may be supplied to the subtank 1 carried in carriage through the ink supply way 32. Moreover, it consists of sub tanks 1 so that ink may be supplied to a recording head 33 through the ink supply bulb 14, and the subtank 1 is connected to the reduced pressure pump 35 as a negative pressure generating means further again through the common attraction way 34 which is open for free passage to the bulb member 6 arranged inside as shown also in drawing 1.

[0029] in addition, as typically shown in drawing 2, in this configuration, it is [in / to the opening 7 of the ink arranged at said subtank / the gravity direction] low [ink derivation section 31a of the ink tank 31] a little, and if it puts in another way, both are stationed so that it may become negative pressure slightly in said opening 7 of the ink. A break through of ink can be made to prevent certainly in the attachment arranged by such configuration on the ink supply stage.

[0030] Next, drawing 3 shows the configuration of the attachment which intervenes between the ink tank 31 and the subtank 1. The attachment 2 by the side of six sub tanks 1 and the subtank arranged at each and the attachment 41 by the side of the ink supply arranged on the ink supply stage are drawn on this drawing 3. That is, this drawing 3 shows the **** condition from the direction which intersects perpendicularly to drawing 1.

[0031] The attachment 41 by the side of ink supply is constituted so that it can move in the vertical direction by the guide projection 43 of four arranged at the inside sense at the guide case 42, and although this attachment 41 is not shown in drawing, it is moved up and down by actuation of actuators, such as a motor, in the predetermined range. The connection opening 44 is formed in the upper bed section of attachment 41, and the other end of the ink supply way 32 where the end was connected to each ink tank 31 by which each ink of six colors was stored is connected to this connection opening 44. And in each Shimo edge of attachment 41, the bulb unit 51 explained after drawing 4 is arranged.

[0032] On the other hand, as explained in drawing 1 also in each subtank 1 side, attachment 2 is arranged, respectively, and the bulb unit 13 explained also in the upper bed section in such attachment 2 after drawing 4 R> 4 is arranged.

[0033] Drawing 4 thru/or drawing 6 show the gestalt of operation of the 1st of the bulb unit in the attachment 41 arranged on the above mentioned ink supply stage, and the bulb unit arranged at the subtank 1 side with a sectional view. In addition, as for drawing 5, drawing 6 (A) and (B) show the **** sectional view in the direction of an arrow head again in an A-A line and a B-B line, respectively. [in / for the condition that the

condition that, as for drawing 4, both of a bulb unit are separated is connected in both / drawing 5]

[0034] First, the outline is formed by joining the 1st and 2nd cylinder-like case 52 and 53 to shaft orientations, O ring 54 is arranged among both, and the bulb unit 51 by the side of an ink supply stage makes the joint the airtight condition. And it is made as [be / through said attachment 41 / the opening 55 formed in the drawing Nakagami edge / on the ink tank 31 / open for free passage].

[0035] ***** 56 which formed heights 56a in the connection end-face side is arranged possible [sliding] at shaft orientations at the axial core of said cylinder-like cases 52 and 53, and with the coil spring 57 arranged between the flange and the 2nd case 53 which were formed in ***** 56, it is energized so that heights 56a of ***** 56 may project in a connection end-face side (the direction of drawing Nakashita).

[0036] Taper section 56b is formed in said a part of ***** 56, and in the projection condition of this ***** 56, it is constituted so that the slant face of taper section 56b may be contacted to the seal member 58. Therefore, in the condition which shows in drawing 4, taper section 56b of ***** 56 can contact to the seal member 58 on the slant face, and can secure sufficient confidentiality.

[0037] Moreover, said a part of seal member 58 has extended to the end-face side at one, and it is constituted so that the seal of the end face of each bulb unit may be carried out in the connection condition of both of the bulb unit shown in drawing 5 by extension section 58a by the side of an end face. The components mark of the seal member 58 can be set to one by such shared configuration.

[0038] On the other hand also in the bulb unit 13 by the side of a subtank, the outline is formed by joining the 1st and 2nd cylinder-like case 61 and 62 to shaft orientations, O ring 63 is arranged among both, and the joint is made into the airtight condition. And the opening 64 formed in the drawing Nakashita edge is opened for free passage at the subtank side.

[0039] ***** 65 which formed heights 65a in the connection end-face side is arranged possible [sliding] at shaft orientations at the axial core of said cylinder-like cases 61 and 62, and with the coil spring 66 arranged between the flange and the 2nd case 62 which were formed in ***** 65, it is energized so that heights 65a of ***** 65 may project in a connection end-face side (the direction of drawing Nakagami). Moreover, it is annularly formed in the flange formed in said ***** 65, and the plate-like seal member 67 is attached, and it is constituted so that the seal member 67 may secure confidentiality in contact with the internal surface of the cylinder-like case 61 according to the energization force of said coil spring 66.

[0040] In the projection condition of ***** 65 furthermore shown in drawing 4, it is constituted so that the space between said ***** 65 and the cylinder-like cases 61 which result in a connection end-face side may be in the condition of hardly forming a clearance from the seal member 67. Thus, by constituting, in the condition that the mutual bulb unit was separated, the amount of residuals of the ink in the connection end face of a bulb unit can be lessened as much as possible, and the problem of making the inside of equipment pollute in residual ink can be removed.

[0041] Drawing 5 shows the condition that both above mentioned bulb unit 51 and bulb unit 13 are connected, and it is desirable to balance mostly the spring force of the coil springs 57 and 66 arranged at both in this. When both spring force is balanced mostly,

each ***** 56 and 65 has almost simultaneous and comparable movement magnitude, and moves, and the passage of ink is formed while it is mutual.
 [0042] By making three projection 56c form between the flange of ***** 56 in the bulb unit 51, and a case 52 in the hoop direction of a flange, it is supported so that it can slide on shaft orientations, and thereby, ink passage is made to form, as drawing 6 (A) which is an A-A cross section in drawing 5 showed on the other hand. Moreover, ***** 56 is supported so that it can slide on shaft orientations by four fins-like member 52a which projects in the direction of an axial center of a case, and thereby, it is making ink passage form, as drawing 6 (B) which is a B-B cross section in drawing 5 showed.

[0043] In addition, although four fins-like member 52a is formed, this can make ***** 56 hold in an axial center location by making at least three or more pieces form in the gestalt of this operation. Moreover, the gestalt shown in this drawing 6 can be adopted also in the bulb unit 13 by the side of a subtank. And the bulb unit 51 arranged at an ink supply stage side and the bulb unit 13 arranged at a subtank side can be used convenient, even if it changes mutually.

[0044] According to the combination of each bulb units 51 and 13 constituted as mentioned above, on the occasion of mutual junction, each heights 56a and 65a first formed in each ***** 56 and 65 join, and it is made as [push / mutually / each ***** 56 and 65 / in the cylinder-like case 52 and 61]. And as for both, extension section 58a of said seal member 58 changes into an airtight condition the seal of the extension section 58a of the seal member 58 arranged at the end-face side of one cylinder-like case 52 by joining both in contact with the end face of the cylinder-like case 61 of another side, and an ink supply way is formed among both because both approach still more.

[0045] Here, in the gestalt of the 1st operation, before [above mentioned] not taking the seal between both by extension section 58a of the seal member 58, each bulb units 51 and 13 will be in a valve-opening condition. The same condition generates this while dissociating from both junction condition.

[0046] However, as explained in drawing 2, the bulb unit 51 by the side of the ink tank 31 can be in few negative pressure conditions in a valve-opening condition especially by taking the arrangement configuration in which the location of ink derivation section 31a of the ink tank 31 turns into a location low a little in the gravity direction to the location of the bulb unit 51, and the inconvenience which ink leaks can be made to avoid. However, a possibility that air may flow backwards from the bulb unit 51 to the ink tank 31 side can also make the above mentioned inconvenience avoid with constituting so that migration actuation of the attachment [in / it is desirable to adjust physical relationship with the ink tank 31 so that extent of said negative pressure may become as small as possible, and / an ink supply stage] 41 may be performed further promptly for a certain reason.

[0047] Next, drawing 7 and drawing 8 show the gestalt of the 2nd and operation of the 3rd of each bulb unit with a sectional view. In addition, the condition which shows the condition shown in drawing 7 that both of a bulb unit are connected in the gestalt of the 2nd operation, and is shown in drawing 8 that both of a bulb unit are separated in the gestalt of the 3rd operation is shown. And the focus of both who show the part equivalent to the gestalt of the 1st operation shown in drawing 4 thru/or drawing 6 with the same sign, therefore showed drawing 7 and drawing 8 is explained.

[0048] That is, in the gestalt of the 2nd shown in drawing 7 and drawing 8, and the 3rd

operation, the ring member 68 is arranged further on the outside of the cylinder-like case 61, and O ring 69 which contacts the cylinder-like case 52 of another side by this ring member 68 is held. And in the condition of connecting both 51 and 13 of a bulb unit, after carrying out a seal between the open air with O ring 69 arranged at the connection end face of the bulb unit 13, it is constituted so that each ***** 56 and 65 in both 51 and 13 of a bulb unit may move and the negotiation of ink may be attained.

[0049] In the gestalt of the 3rd operation especially shown in drawing 8, a coil spring 70 is further arranged between the cylinder-like case 61 and said ring member 68, and it is constituted so that O ring 69 may be energized in the direction of a connection end face. Therefore, in case both 51 and 13 of a bulb unit are connected, in contact with the end face of the bulb unit 51 of another side, a seal is made between the open air, and each ***** 56 and 65 in both 51 and 13 of a bulb unit moves after that, and it is made for the negotiation of ink to be attained according to the energization force of a coil spring 70, and the elastic force of O ring 69 according to this configuration.

[0050] In the configuration explained above, if the amount of ink in the subtank 1 shown in drawing 1 by continuation of printing actuation decreases and it will be in ink and a condition, it will be said float member 3 in the condition of having sunk through the shaft 4. Then, carriage moves to an ink supply stage, and as shown in drawing 3, the attachment 2 by the side of a subtank and the attachment 41 by the side of the ink supply arranged on the ink supply stage are connected.

[0051] Moreover, although not shown in drawing, it connects with the attraction way 34 where attraction opening of the bulb member 6 leads to the reduced pressure pump 35 through the same attachment. Moreover, in this condition, the air installation bulb 15 which changed the ink supply bulb 14 from the subtank 1 to a recording head 33 into the clausilium condition, and was described above is also made into a clausilium condition.

[0052] ***** 56 and 65 of each bulb units 51 and 13 shown after drawing 4 moves by this, and it will be in the condition which can circulate ink. On the other hand, since the seal member 5 arranged at the float member 3 is in the condition of having separated from the bulb member 6, the inside of the subtank 1 is made a reduced pressure condition by actuation of the reduced pressure pump 35. Therefore, ink is supplied in the subtank 7 through said bulb units 51 and 13 from the ink tank 31.

[0053] Thus, when ink is supplied in the subtank 1 from the ink tank 31 and the ink in the subtank 1 becomes almost full, said float member 3 surfaces in ink, and said seal member 5 makes an air valve a clausilium condition in contact with the bulb member 6 in connection with this. At this time, the seal member 5 will be in the condition of it having been drawn in by the reduced pressure pump 35 and having stuck to the bulb member 6, and it will be stopped by the reduced pressure in the subtank 1. Therefore, makeup of the ink from the ink tank 31 to into the subtank 1 is also stopped.

[0054] And when it fills up with ink in all sub tanks, association with the attachment 41 arranged on the ink supply stage and the attachment 2 arranged at the subtank is solved.

Thereby, the bulb units 51 and 13 arranged, respectively are divided into the attachment 41 arranged on the ink supply stage, and the attachment 2 arranged at the subtank.

Therefore, as described above, each ***** 56 and 65 arranged at each bulb units 51 and 13 is returned to the original condition according to the energization force of each coil springs 57 and 66, and the ink supply way in each bulb units 51 and 13 is blockaded.

[0055] Thereby, the phenomenon which ink leaks can be prevented from the connection

edge in the bulb units 51 and 13. And the air installation bulb 15 which changed the ink supply bulb 14 from the subtank 1 to [this condition] a recording head 33 into the valve-opening condition, and was described above is also made into a valve-opening condition, and printing by the recording head 33 is started.

[0056] Thus, when printing actuation by the recording head 33 is performed and the ink in the subtank 1 decreases in number by this, on an ink supply stage, makeup of ink is made according to the same operation as the above, and printing actuation by the recording head 33 is performed again.

[0057]

[Effect of the Invention] In the ink supply way from an ink tank to [the above explanation / so that clearly / according to the ink jet type recording device concerning this invention] a recording head Since the attachment equipped with the bulb unit with which an ink supply way is blockaded in both connection in the condition that it was constituted possible [attachment and detachment], enabled the negotiation of ink in both connection condition, and both were separated, respectively is provided It can also be prevented that can make it prevent that ink leaks out from a connection in both separation condition, and air flows backwards from a connection.

[0058] And it can have the subtank carried especially in carriage, when this is adopted as the recording apparatus constituted so that ink might be supplied to a subtank on an ink supply stage, the ink supply tube connected with a subtank from an ink tank like before can be eliminated, and it can contribute to making the configuration as a recording apparatus simplify.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the ink jet type recording device which has arranged the attachment arranged possible [attachment and detachment] on the ink supply way from an ink tank especially to a recording head about the ink jet type recording device possessing the recording head by which is carried in carriage and both-way actuation is carried out crosswise [of a record form], and the ink tank which supplies ink to said recording head.

PRIOR ART

[Description of the Prior Art] An ink jet type recording device has the comparatively small noise at the time of printing, and since it can form a dot small moreover by the high consistency, it is used for many printings which include color printing in these days. Record is performed by making an ink droplet breathe out to a record form, having the ink jet type recording head which such an ink jet type recording apparatus is generally carried on carriage, and moves crosswise [of a record form], and the paper feed means to which a record form is relatively moved to a recording head, and moving a recording head crosswise [of a record form] on carriage.

[0003] And on common carriage, the recording head for Black which carries out the regurgitation for example, of the black ink, and yellow, cyanogen and the recording head

for colors in which the regurgitation of each ink of a Magenta is possible are carried, and full color printing is enabled by changing the regurgitation rate of not only the text print in black ink but each ink.

[0004] On the other hand, in order to make it correspond to printing of a large quantity comparatively in this kind with which for example, for office or business use is provided of recording device, the recording device of a format with which the wearing equipment (cartridge holder) which will need to arrange a mass ink cartridge, for this reason has arranged the ink tank as an ink cartridge to the flank of for example, the body of equipment is made to load is offered. And it is constituted so that a subtank may be arranged, ink may be supplied from said ink tank through an ink supply tube to each subtank and ink may be further supplied from each subtank to a recording head, respectively on the carriage with which the recording head was carried.

EFFECT OF THE INVENTION

[Effect of the Invention] In the ink supply way from an ink tank to [the above explanation / so that clearly / according to the ink jet type recording device concerning this invention] a recording head Since the attachment equipped with the bulb unit with which an ink supply way is blockaded in both connection in the condition that it was constituted possible [attachment and detachment], enabled the negotiation of ink in both connection condition, and both were separated, respectively is provided It can also be prevented that can make it prevent that ink leaks out from a connection in both separation condition, and air flows backwards from a connection.

[0058] And it can have the subtank carried especially in carriage, when this is adopted as the recording apparatus constituted so that ink might be supplied to a subtank on an ink supply stage, the ink supply tube connected with a subtank from an ink tank like before can be eliminated, and it can contribute to making the configuration as a recording apparatus simplify.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, in a recording apparatus which was described above, in order to supply ink to each subtank from each ink tank, each ink is made to correspond, the ink supply tube is connected, and it has the problem that where of this ink supply tube gives resistance to migration of carriage, in the recording apparatus with a long scan distance which prints to the large-sized space demanded especially in these days.

[0006] Then, when the above mentioned ink supply tube is eliminated and the ink residue in a subtank decreases, carriage moves to an ink supply stage and the recording device of the format which supplies ink from each ink tank to each subtank by making the inside of a subtank decompress through attachment in the part concerned is proposed in this applicant. In this case, the need of arranging the attachment for supplying ink between an ink supply stage and a subtank side possible [attachment and detachment] arises.

[0007] This invention is made based on such a technical background, and is set to said

attachment. With constituting so that an ink supply way may be blockaded in both connection in the condition that enabled the negotiation of ink in both connection condition, and both were separated, respectively While preventing a break through of the ink at the time of connectionless, it aims at offering the ink jet type recording device the closure condition enabled it to hold also to a subtank side.

MEANS

[Means for Solving the Problem] The basic configuration of the ink jet type recording device concerning this invention made in order to attain the above mentioned object The recording head by which is carried in carriage and both-way actuation is carried out crosswise [of a record form], It is an ink jet type recording device possessing the ink tank which supplies ink to said recording head. On the ink supply way from said ink tank to a recording head, it is constituted possible [attachment and detachment]. The negotiation of ink is enabled in both connection condition, and the attachment equipped with the bulb unit with which an ink supply way is blockaded in both connection in the condition that both were separated, respectively possesses.

[0009] In this case, between said ink tanks and recording heads, while being carried in carriage with a recording head and receiving supply of ink from an ink tank, it is suitable to adopt it as the recording device possessing the subtank which supplies ink to said recording head.

[0010] Furthermore, it functions on validity more by it being arranged on the ink supply stage in which one side of said attachment is located near the moving trucking of carriage, and another side of said attachment being carried in a carriage side, and adopting it as a recording device with which carriage becomes connectable in both of said attachment in the condition of having been located in the ink supply stage.

[0011] And it is desirable for ***** energized in the direction which is arranged in a cylinder-like case and projects mutually to said bulb unit, and the seal member by the flexible raw material with which an ink supply way is blockaded in the projection condition of said ***** to possess, and to be constituted based on migration of each ***** by both connection, so that the negotiation of ink may be attained.

[0012] In this case, the taper section is formed in said a part of ***** at least in one side of said bulb unit. It is desirable to be constituted so that the slant face of the taper section may be contacted to said seal member in the projection condition of said *****.

Moreover, as for at least one side of the bulb unit in the projection condition of said ***** , it is desirable to be constituted so that the space between said ***** which results in a connection end-face side, and said cylinder-like case may be in the condition of hardly forming a clearance from a seal member.

[0013] Moreover, it is supported so that ***** within said cylinder-like case can slide on shaft orientations by at least three fin-like members which project in the direction of an axial center of a case. It is desirable to constitute so that ink passage may be formed between said each fin-like member. Moreover, the seal member by which ***** at least in one side of said bulb unit is contacted preferably extends to the end-face side of a bulb unit at one. It is constituted by said seal member which extended to the end-face side in the connection condition of both of a bulb unit so that the seal of the end face of each

bulb unit may be carried out.

[0014] Furthermore, a seal member is arranged at the connection end face at least in one side, and after a seal is carried out between the open air by the seal member arranged in the condition of connecting both of a bulb unit at said connection end face, the configuration which each ***** in both of a bulb unit moves, and enables the negotiation of ink can also be adopted suitably.

[0015] According to the above configuration, when it is adopted as the recording apparatus constituted so that ink could be supplied to a recording head side through said attachment, it might have especially a subtank and ink might be supplied to a subtank on an ink supply stage, the ink supply tube connected with a subtank from an ink tank like before can be eliminated.

[0016] And since attachment enables the negotiation of ink in both connection condition and it considers as the configuration by which an ink supply way is blockaded in both connection, respectively in the condition that both were separated, while being able to make it prevent that ink leaks out from a connection in both separation condition, it can also be made to prevent that atmospheric air flows backwards from a connection.

[0017]

[Embodiment of the Invention] Hereafter, the ink jet type recording device concerning this invention is explained based on the gestalt of operation shown in drawing. Drawing 1 shows the configuration of the attachment by the side of the subtank in the ink jet type recording apparatus with which this invention was applied, and a subtank with a sectional view. The attachment 2 attached in the subtank 1 and its upper part is carried in carriage with the recording head mentioned later, and it is constituted so that both-way actuation may be carried out crosswise [of a record form (not shown)]. And while receiving supply of ink from an ink tank through said attachment 2, it is constituted so that ink can be supplied to said recording head.

[0018] The subtank 1 shown in the bottom half section of drawing 1 is constituted by case 1a to which opening of the upper part was carried out, and lid 1b which blockades the upper part, and these are combined by means, such as ultrasonic welding or oscillating joining, and it forms ink reservoir room 1c by which the interior was sealed by this. And in this subtank 1, the float member 3 which surfaces in the ink stored in the subtank is arranged. This float member 3 is constituted so that it can carry out movable in the gravity direction up and down by setting the support shaft 4 formed in one at this float member as a rotation core.

[0019] Moreover, by arranging the seal member 5 in the upper part of the subtank 1, and this seal member's 5 surfacing in the ink with which it filled up into the subtank 1, and contacting the bulb member 6 which constitutes the air valve arranged in the upper part of the subtank 1, it is constituted so that the attraction way which passes to the reduced pressure pump as a negative pressure generating means to mention later can be blockaded.

[0020] Moreover, the opening 7 of the ink which receives supply of ink from the ink tank later mentioned through the attachment 2 shown in the subtank 1 at the Johan section is arranged, and the ink feed hopper 8 which supplies ink to the recording head later mentioned through attachment 2 is also arranged by the subtank 1. Furthermore the air induction inlet 9 is arranged in the upper part of the subtank 1, and it is constituted so that air can be introduced from this air induction inlet 9 corresponding to consumption of the

ink accompanying printing.

[0021] In addition, although the configuration about one subtank is shown in drawing 1, corresponding to each ink treated, the subtank of the same configuration of plurality (it sets in the gestalt of this operation and they are six pieces) will be put side by side for this to the space top perpendicular direction.

[0022] On the other hand, the common bulb unit 11 connected to a reduced pressure pump side through the attraction space (henceforth attraction opening) 10 which is open for free passage to the bulb member 6 is arranged at attachment 2. Respectively corresponding to each subtank, said attraction space 10 is open for free passage to a space top perpendicular direction across boundaries, and is formed in it, therefore through the common bulb unit 11, the attraction space 10 is constituted so that it can connect with the attachment of the others mentioned later arranged on the ink supply stage. In addition, said bulb unit 11 is constituted so that it may open, when connecting with other attachment arranged on the ink supply stage.

[0023] Moreover, the makeup space 12 which sends in ink in said attachment 2 in the opening 7 of the ink makes each subtank 1 correspond, and is formed according to the individual, and it is constituted so that it can connect with the attachment of the others mentioned later arranged on the ink supply stage through the bulb unit 13 arranged in each makeup space 12. In addition, also in said each bulb unit 13, it is constituted so that it may open, when connecting with other attachment arranged on the ink supply stage.

[0024] On the ink supply way to [from the ink feed hopper 8] a recording head in attachment 2, the ink supply bulb 14 by which closing motion control is carried out makes each subtank correspond, and is arranged according to the individual. Furthermore, although make each subtank correspond and it is arranged according to the individual, and the air installation space 16 through the air installation bulb 15 is open for free passage across boundaries, and is formed and the air installation bulb 15 which counters the above mentioned air induction inlet 9, and is opened and closed in attachment 2 is not shown in drawing 1, a part of air installation space 16 is opened by atmospheric air.

[0025] As the configuration of ink feed hopper 8 part shows between said sub tanks 1 and attachment 2, for example, as the communication trunk 17 which extends to one presses fit in the flexible seal member 19 in a circle arranged at the cavity 18 formed in the attachment 2 side, it is connected to it from the sub tank 1 side. This configuration is similarly constituted in the opening of ink 7 above mentioned part, bulb member 6 part, and air induction inlet 9 part.

[0026] And in the gestalt of operation shown in drawing 1, the projection 20 which protruded on one side attachment wall of the sub tank 1 enters into the engagement hole 21 formed in attachment 2, and on the other hand, as the engagement pawl 23 formed in attachment 2 gets over to the projection 22 formed in the side attachment wall of another side of the sub tank 1, both are combined with it by one.

[0027] Drawing 2 shows the basic configuration of one ink supply system which supplies ink to a recording head through the above mentioned sub tank from the ink cartridge as an ink tank by the mimetic diagram. In addition, in drawing 2, the attachment 2 by the side of the sub tank shown in drawing 1 and the attachment in the ink supply stage which is connected to this attachment and which is mentioned later are omitted and shown.

[0028] The sign 31 in drawing 2 shows the ink tank, and the cartridge holder arranged for

example, on both the outsides of a recording apparatus is loaded with this ink tank 31. And it is constituted so that ink may be supplied to the subtank 1 carried in carriage through the ink supply way 32. Moreover, it consists of sub tanks 1 so that ink may be supplied to a recording head 33 through the ink supply bulb 14, and the sub tank 1 is connected to the reduced pressure pump 35 as a negative pressure generating means further again through the common attraction way 34 which is open for free passage to the bulb member 6 arranged inside as shown also in drawing 1.

[0029] in addition, as typically shown in drawing 2, in this configuration, it is [in / to the opening 7 of the ink arranged at said sub tank / the gravity direction] low [ink derivation section 31a of the ink tank 31] a little, and if it puts in another way, both are stationed so that it may become negative pressure slightly in said opening 7 of the ink. A break through of ink can be made to prevent certainly in the attachment arranged by such configuration on the ink supply stage.

[0030] Next, drawing 3 shows the configuration of the attachment which intervenes between the ink tank 31 and the sub tank 1. The attachment 2 by the side of six sub tanks 1 and the sub tank arranged at each and the attachment 41 by the side of the ink supply arranged on the ink supply stage are drawn on this drawing 3. That is, this drawing 3 shows the **** condition from the direction which intersects perpendicularly to drawing 1.

[0031] The attachment 41 by the side of ink supply is constituted so that it can move in the vertical direction by the guide projection 43 of four arranged at the inside sense at the guide case 42, and although this attachment 41 is not shown in drawing, it is moved up and down by actuation of actuators, such as a motor, in the predetermined range. The connection opening 44 is formed in the upper bed section of attachment 41, and the other end of the ink supply way 32 where the end was connected to each ink tank 31 by which each ink of six colors was stored is connected to this connection opening 44. And in each Shimo edge of attachment 41, the bulb unit 51 explained after drawing 4 is arranged.

[0032] On the other hand, as explained in drawing 1 also in each sub tank 1 side, attachment 2 is arranged, respectively, and the bulb unit 13 explained also in the upper bed section in such attachment 2 after drawing 4 R> 4 is arranged.

[0033] Drawing 4 thru/or drawing 6 show the gestalt of operation of the 1st of the bulb unit in the attachment 41 arranged on the above mentioned ink supply stage, and the bulb unit arranged at the sub tank 1 side with a sectional view. In addition, as for drawing 5, drawing 6 (A) and (B) show the **** sectional view in the direction of an arrow head again in an A-A line and a B-B line, respectively. [in / for the condition that the condition that, as for drawing 4, both of a bulb unit are separated is connected in both / drawing 5]

[0034] First, the outline is formed by joining the 1st and 2nd cylinder-like case 52 and 53 to shaft orientations, O ring 54 is arranged among both, and the bulb unit 51 by the side of an ink supply stage makes the joint the airtight condition. And it is made as [be / through said attachment 41 / the opening 55 formed in the drawing Nakagami edge / on the ink tank 31 / open for free passage].

[0035] ***** 56 which formed heights 56a in the connection end-face side is arranged possible [sliding] at shaft orientations at the axial core of said cylinder-like cases 52 and 53, and with the coil spring 57 arranged between the flange and the 2nd case 53 which were formed in ***** 56, it is energized so that heights 56a of ***** 56 may project

in a connection end-face side (the direction of drawing Nakashita).

[0036] Taper section 56b is formed in said a part of ***** 56, and in the projection condition of this ***** 56, it is constituted so that the slant face of taper section 56b may be contacted to the seal member 58. Therefore, in the condition which shows in drawing 4, taper section 56b of ***** 56 can contact to the seal member 58 on the slant face, and can secure sufficient confidentiality.

[0037] Moreover, said a part of seal member 58 has extended to the end-face side at one, and it is constituted so that the seal of the end face of each bulb unit may be carried out in the connection condition of both of the bulb unit shown in drawing 5 by extension section 58a by the side of an end face. The components mark of the seal member 58 can be set to one by such shared configuration.

[0038] On the other hand also in the bulb unit 13 by the side of a subtank, the outline is formed by joining the 1st and 2nd cylinder-like case 61 and 62 to shaft orientations, O ring 63 is arranged among both, and the joint is made into the airtight condition. And the opening 64 formed in the drawing Nakashita edge is opened for free passage at the subtank side.

[0039] ***** 65 which formed heights 65a in the connection end-face side is arranged possible [sliding] at shaft orientations at the axial core of said cylinder-like cases 61 and 62, and with the coil spring 66 arranged between the flange and the 2nd case 62 which were formed in ***** 65, it is energized so that heights 65a of ***** 65 may project in a connection end-face side (the direction of drawing Nakagami). Moreover, it is annularly formed in the flange formed in said ***** 65, and the plate-like seal member 67 is attached, and it is constituted so that the seal member 67 may secure confidentiality in contact with the internal surface of the cylinder-like case 61 according to the energization force of said coil spring 66.

[0040] In the projection condition of ***** 65 furthermore shown in drawing 4, it is constituted so that the space between said ***** 65 and the cylinder-like cases 61 which result in a connection end-face side may be in the condition of hardly forming a clearance from the seal member 67. Thus, by constituting, in the condition that the mutual bulb unit was separated, the amount of residuals of the ink in the connection end face of a bulb unit can be lessened as much as possible, and the problem of making the inside of equipment pollute in residual ink can be removed.

[0041] Drawing 5 shows the condition that both above mentioned bulb unit 51 and bulb unit 13 are connected, and it is desirable to balance mostly the spring force of the coil springs 57 and 66 arranged at both in this. When both spring force is balanced mostly, each ***** 56 and 65 has almost simultaneous and comparable movement magnitude, and moves, and the passage of ink is formed while it is mutual.

[0042] By making three projection 56c form between the flange of ***** 56 in the bulb unit 51, and a case 52 in the hoop direction of a flange, it is supported so that it can slide on shaft orientations, and thereby, ink passage is made to form, as drawing 6 (A) which is an A-A cross section in drawing 5 showed on the other hand. Moreover, ***** 56 is supported so that it can slide on shaft orientations by four fins-like member 52a which projects in the direction of an axial center of a case, and thereby, it is making ink passage form, as drawing 6 (B) which is a B-B cross section in drawing 5 showed.

[0043] In addition, although four fins-like member 52a is formed, this can make ***** 56 hold in an axial center location by making at least three or more pieces form in the

gestalt of this operation. Moreover, the gestalt shown in this drawing 6 can be adopted also in the bulb unit 13 by the side of a subtank. And the bulb unit 51 arranged at an ink supply stage side and the bulb unit 13 arranged at a subtank side can be used convenient, even if it changes mutually.

[0044] According to the combination of each bulb units 51 and 13 constituted as mentioned above, on the occasion of mutual junction, each heights 56a and 65a first formed in each ***** 56 and 65 join, and it is made as [push / mutually / each ***** 56 and 65 / in the cylinder-like case 52 and 61]. And as for both, extension section 58a of said seal member 58 changes into an airtight condition the seal of the extension section 58a of the seal member 58 arranged at the end-face side of one cylinder-like case 52 by joining both in contact with the end face of the cylinder-like case 61 of another side, and an ink supply way is formed among both because both approach still more.

[0045] Here, in the gestalt of the 1st operation, before [above mentioned] not taking the seal between both by extension section 58a of the seal member 58, each bulb units 51 and 13 will be in a valve-opening condition. The same condition generates this while dissociating from both junction condition.

[0046] However, as explained in drawing 2, the bulb unit 51 by the side of the ink tank 31 can be in few negative pressure conditions in a valve-opening condition especially by taking the arrangement configuration in which the location of ink derivation section 31a of the ink tank 31 turns into a location low a little in the gravity direction to the location of the bulb unit 51, and the inconvenience which ink leaks can be made to avoid.

However, a possibility that air may flow backwards from the bulb unit 51 to the ink tank 31 side can also make the above mentioned inconvenience avoid with constituting so that migration actuation of the attachment [in / it is desirable to adjust physical relationship with the ink tank 31 so that extent of said negative pressure may become as small as possible, and / an ink supply stage] 41 may be performed further promptly for a certain reason.

[0047] Next, drawing 7 and drawing 8 show the gestalt of the 2nd and operation of the 3rd of each bulb unit with a sectional view. In addition, the condition which shows the condition shown in drawing 7 that both of a bulb unit are connected in the gestalt of the 2nd operation, and is shown in drawing 8 that both of a bulb unit are separated in the gestalt of the 3rd operation is shown. And the focus of both who show the part equivalent to the gestalt of the 1st operation shown in drawing 4 thru/or drawing 6 with the same sign, therefore showed drawing 7 and drawing 8 is explained.

[0048] That is, in the gestalt of the 2nd shown in drawing 7 and drawing 8, and the 3rd operation, the ring member 68 is arranged further on the outside of the cylinder-like case 61, and O ring 69 which contacts the cylinder-like case 52 of another side by this ring member 68 is held. And in the condition of connecting both 51 and 13 of a bulb unit, after carrying out a seal between the open air with O ring 69 arranged at the connection end face of the bulb unit 13, it is constituted so that each ***** 56 and 65 in both 51 and 13 of a bulb unit may move and the negotiation of ink may be attained.

[0049] In the gestalt of the 3rd operation especially shown in drawing 8, a coil spring 70 is further arranged between the cylinder-like case 61 and said ring member 68, and it is constituted so that O ring 69 may be energized in the direction of a connection end face. Therefore, in case both 51 and 13 of a bulb unit are connected, in contact with the end face of the bulb unit 51 of another side, a seal is made between the open air, and each

***** 56 and 65 in both 51 and 13 of a bulb unit moves after that, and it is made for the negotiation of ink to be attained according to the energization force of a coil spring 70, and the elastic force of O ring 69 according to this configuration.

[0050] In the configuration explained above, if the amount of ink in the subtank 1 shown in drawing 1 by continuation of printing actuation decreases and it will be in ink and a condition, it will be said float member 3 in the condition of having sunk through the shaft 4. Then, carriage moves to an ink supply stage, and as shown in drawing 3, the attachment 2 by the side of a subtank and the attachment 41 by the side of the ink supply arranged on the ink supply stage are connected.

[0051] Moreover, although not shown in drawing, it connects with the attraction way 34 where attraction opening of the bulb member 6 leads to the reduced pressure pump 35 through the same attachment. Moreover, in this condition, the air installation bulb 15 which changed the ink supply bulb 14 from the subtank 1 to a recording head 33 into the clausilium condition, and was described above is also made into a clausilium condition.

[0052] ***** 56 and 65 of each bulb units 51 and 13 shown after drawing 4 moves by this, and it will be in the condition which can circulate ink. On the other hand, since the seal member 5 arranged at the float member 3 is in the condition of having separated from the bulb member 6, the inside of the subtank 1 is made a reduced pressure condition by actuation of the reduced pressure pump 35. Therefore, ink is supplied in the subtank 7 through said bulb units 51 and 13 from the ink tank 31.

[0053] Thus, when ink is supplied in the subtank 1 from the ink tank 31 and the ink in the subtank 1 becomes almost full, said float member 3 surfaces in ink, and said seal member 5 makes an air valve a clausilium condition in contact with the bulb member 6 in connection with this. At this time, the seal member 5 will be in the condition of it having been drawn in by the reduced pressure pump 35 and having stuck to the bulb member 6, and it will be stopped by the reduced pressure in the subtank 1. Therefore, makeup of the ink from the ink tank 31 to into the subtank 1 is also stopped.

[0054] And when it fills up with ink in all subtanks, association with the attachment 41 arranged on the ink supply stage and the attachment 2 arranged at the subtank is solved. Thereby, the bulb units 51 and 13 arranged, respectively are divided into the attachment 41 arranged on the ink supply stage, and the attachment 2 arranged at the subtank.

Therefore, as described above, each ***** 56 and 65 arranged at each bulb units 51 and 13 is returned to the original condition according to the energization force of each coil springs 57 and 66, and the ink supply way in each bulb units 51 and 13 is blockaded.

[0055] Thereby, the phenomenon which ink leaks can be prevented from the connection edge in the bulb units 51 and 13. And the air installation bulb 15 which changed the ink supply bulb 14 from the subtank 1 to [this condition] a recording head 33 into the valve-opening condition, and was described above is also made into a valve-opening condition, and printing by the recording head 33 is started.

[0056] Thus, when printing actuation by the recording head 33 is performed and the ink in the subtank 1 decreases in number by this, on an ink supply stage, makeup of ink is made according to the same operation as the above, and printing actuation by the recording head 33 is performed again.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view having shown the configuration of the subtank and attachment in the ink jet type recording apparatus which applied this invention.

[Drawing 2] It is the mimetic diagram having shown the configuration of the ink supply system from an ink tank to a recording head.

[Drawing 3] It is the side elevation having shown the configuration of the attachment arranged on the ink supply stage.

[Drawing 4] It is the sectional view having shown the gestalt of operation of the 1st of the bulb unit arranged at attachment.

[Drawing 5] It is the sectional view showing the condition that the bulb unit was similarly connected.

[Drawing 6] It is the sectional view of a **** bulb unit in the direction of an arrow head from the A-A line and B-B line in drawing 5 .

[Drawing 7] It is the sectional view having shown the gestalt of operation of the 2nd of the bulb unit arranged at attachment.

[Drawing 8] It is the sectional view having shown the gestalt of operation of the 3rd of the bulb unit arranged at attachment.

[Description of Notations]

- 1 SubTank
- 2 Attachment
- 3 Float Member
- 5 Seal Member
- 6 Bulb Member (Air Valve)
- 7 Opening of the Ink
- 8 Ink Feed Hopper
- 9 Air Induction Inlet
- 10 Attraction Space (Attraction Opening)
- 13 Bulb Unit
- 14 Ink Supply Bulb
- 15 Air Installation Bulb
- 31 Ink Tank
- 32 Ink Supply Way
- 33 Recording Head
- 34 Attraction Way
- 35 Reduced Pressure Pump (Negative Pressure Generating Means)
- 41 Attachment
- 51 Bulb Unit
- 52 1st Case
- 52a Fin-like member
- 53 2nd Case
- 56 *****
- 56a Heights
- 56b Taper section
- 57 Coil Spring
- 58 Seal Member

61 1st Case
62 2nd Case
65 *****
65a Heights
66 Coil Spring
67 Seal Member

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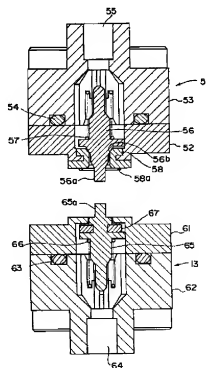
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(54)【発明の名称】 インクジェット式記録装置

(57)【要約】

【課題】 分離状態においてインクの漏出を防止することができる接続機構を備えたインクジェット式記録装置を提供すること。

【解決手段】 接続機構に配置されるバルブユニット51、13には、シリンダ状ケース52、61内に配置されて互い突出する方向に付勢された突当棒56、65と、この突当棒56、65の突出状態においてインク供給路が閉塞されるシール部材58、67とが具備され、両者の接続によるそれぞれの突当棒56、65の移動に基づいて、インクの流通が可能となるように構成されている。特にキャリッジに搭載されるサブタンクを備え、インク供給ステージにおいてサブタンクに対してインクを供給するように構成した記録装置にこれを採用した場合においては、従来のようにインクタンクからサブタンクに連結するインク供給チューブを排除することができる。



【特許請求の範囲】

【請求項1】 キャリッジに搭載されて記録用紙の幅方向に往復駆動される記録ヘッドと、前記記録ヘッドにインクを供給するインクタンクとを具備したインクジェット式記録装置であって、

前記インクタンクから記録ヘッドに至るインク供給路において接離可能に構成され、両者の接続状態においてインクの流通を可能とし、両者が分離された状態において両者の接続部においてそれぞれインク供給路が閉塞されるバルブユニットを備えた接続機構を具備してなるインクジェット式記録装置。

【請求項2】 前記インクタンクと記録ヘッドとの間には記録ヘッドと共にキャリッジに搭載され、インクタンクからインクの供給を受けると共に前記記録ヘッドにインクを供給するサブタンクが具備され、前記インクタンクとサブタンクとの間において前記接続機構を配置してなる請求項1に記載のインクジェット式記録装置。

【請求項3】 前記接続機構の一方がキャリッジの移動経路の近傍に位置するインク供給ステージに配置され、前記接続機構の他方がキャリッジ側に搭載されて、キャリッジがインク供給ステージに位置した状態において、前記接続機構の両者で接続可能となるように構成した請求項2に記載のインクジェット式記録装置。

【請求項4】 前記バルブユニットには、シリンダケース内に配置されて互いに突出する方向に付勢された突当棒と、前記突当棒の突出状態においてインク供給路が閉塞される可撓性素材によるシール部材とが具備され、両者の接続によるそれぞれの突当棒の移動に基づいて、インクの流通が可能となるように構成された請求項1乃至請求項3のいずれかに記載のインクジェット式記録装置。

【請求項5】 前記バルブユニットの少なくとも一方における前記突当棒の一部にテーパー部が形成され、前記突当棒の突出状態において前記シール部材に対してテーパー部の斜面が当接されるように構成した請求項4に記載のインクジェット式記録装置。

【請求項6】 前記突当棒の突出状態におけるバルブユニットの少なくとも一方は、前記シール部材から接続端面側に至る前記突当棒と前記シリンダ状ケースとの間における空間が、ほとんど隙間を形成しない状態となるように構成した請求項4に記載のインクジェット式記録装置。

【請求項7】 前記シリンダ状ケース内における突当棒が、シリンダ状ケースの軸心方向に突出する少なくとも3個のフィン状部材により軸方向に撓動できるように支持され、前記各フィン状部材の間にインク流路を形成してなる請求項4乃至請求項6のいずれかに記載のインクジェット式記録装置。

【請求項8】 前記バルブユニットの少なくとも一方における突当棒が当接されるシール部材がバルブユニット

の端面側に一体に延出され、バルブユニットの両者の接続状態において端面側に延出された前記シール部材によって、それぞれのバルブユニットの端面がシールされるように構成した請求項4乃至請求項7のいずれかに記載のインクジェット式記録装置。

【請求項9】 前記バルブユニットの少なくとも一方における接続端面にシール部材が配置され、バルブユニットの両者を接続する状態において、前記接続端面に配置されたシール部材によって外気との間でシールされた後、バルブユニットの両者におけるそれぞれの突当棒が移動してインクの流通が可能となるように構成された請求項4に記載のインクジェット式記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明はキャリッジに搭載されて記録用紙の幅方向に往復駆動される記録ヘッドと、前記記録ヘッドにインクを供給するインクタンクとを具備したインクジェット式記録装置に関し、特にインクタンクから記録ヘッドに至るインク供給路において接離可能に配置された接続機構を配置したインクジェット式記録装置に関する。

【0002】

【従来の技術】 インクジェット式記録装置は、印刷時の騒音が比較的小さく、しかも小さなドットを高い密度で形成できるため、昨今においてはカラー印刷を含めた多くの印刷に使用されている。このようなインクジェット式記録装置は、一般にキャリッジ上に搭載されて記録用紙の幅方向に移動するインクジェット式記録ヘッドと、記録用紙を記録ヘッドに対して相対的に移動させる紙送り手段が備えられ、キャリッジ上で記録用紙の幅方向に記録ヘッドを移動させながら記録用紙に対してインク滴を吐出させることで記録が行われる。

【0003】 そして共通のキャリッジ上に、例えばブラックインクを吐出するブラック用記録ヘッドと、イエロー、シアン、マゼンタの各インクの吐出が可能なカラー用記録ヘッドを搭載し、ブラックインクによるテキスト印刷ばかりでなく、各インクの吐出割合を変えることにより、フルカラー印刷を可能としている。

【0004】 一方、例えばオフィス向けまたは業務用に提供されるこの種の記録装置においては、比較的大量の印刷に対応させるために、大容量のインクカートリッジを配備する必要が生じ、このためにインクカートリッジとしてのインクタンクを例えば装置本体の側部に配置した装着装置（カートリッジホルダ）に装填させる形式の記録装置が提供されている。そして、記録ヘッドが搭載されたキャリッジ上にサブタンクを配置して、前記インクタンクから各サブタンクに対してインク供給チューブを介してインクを供給し、さらに各サブタンクからそれぞれ記録ヘッドに対してインクを供給するように構成されている。

【0005】

【発明が解決しようとする課題】ところで、前記したような記録装置においては、各インクタンクから各サブタンクにインクを供給するために、それぞれのインクに対応させてインク供給チューブが接続されており、特に昨今において要求されている大型の紙面に対して印刷を行うような走査距離の長い記録装置においては、このインク供給チューブがキャリッジの移動に抵抗を与えるという問題を抱えている。

【0006】そこで、前記したインク供給チューブを排除し、サブタンク内のインク残量が少なくなった時に、キャリッジがインク供給ステージに移動し、当該箇所において接続機構を介してサブタンク内を減圧させることで各インクタンクから各サブタンクに対してインクを供給する形式の記録装置が本件出願人において提案されている。この場合、インク供給ステージとサブタンク側との間にインクを補給するための接続機構を接離可能に配置する必要が生ずる。

【0007】本発明は、このような技術的背景に基づいてなされたものであり、前記接続機構において、両者の接続状態においてインクの流通を可能とし、両者が分離された状態において両者の接続部においてそれぞれインク供給路が閉塞されるように構成することで、非接続時におけるインクの漏出を防止すると共にサブタンク側に対しても封止状態が保持し得るようにしたインクジェット式記録装置を提供することを目的とするものである。

【0008】

【課題を解決するための手段】前記した目的を達成するためになされた本発明にかかるインクジェット式記録装置の基本構成は、キャリッジに搭載されて記録用紙の幅方向に往復駆動される記録ヘッドと、前記記録ヘッドにインクを供給するインクタンクとを具備したインクジェット式記録装置であって、前記インクタンクから記録ヘッドに至るインク供給路において接離可能に構成され、両者の接続状態においてインクの流通を可能とし、両者が分離された状態において両者の接続部においてそれぞれインク供給路が閉塞されるバルブユニットを備えた接続機構が具備される。

【0009】この場合、前記インクタンクと記録ヘッドとの間には、記録ヘッドと共にキャリッジに搭載され、インクタンクからインクの供給を受けると共に前記記録ヘッドにインクを供給するサブタンクを具備した記録装置に採用することが好適である。

【0010】さらに、前記接続機構の一方がキャリッジの移動経路の近傍に位置するインク供給ステージに配置され、前記接続機構の他方がキャリッジに搭載され、キャリッジがインク供給ステージに位置した状態において、前記接続機構の両者で接続可能となるような記録装置に採用することでより有効に機能する。

【0011】そして前記バルブユニットには、シリンドリカルケース内に配置されて互い突出する方向に付勢された突当棒と、前記突当棒の突出状態においてインク供給路が閉塞される可撓性素材によるシール部材とが具備され、両者の接続によるそれぞれの突当棒の移動に基づいて、インクの流通が可能となるように構成されることが好ましい。

【0012】この場合、前記バルブユニットの少なくとも一方における前記突当棒の一部にテーパー部が形成され、前記突当棒の突出状態において前記シール部材に対してテーパー部の斜面が当接されるように構成されていることが好ましく、また前記突当棒の突出状態におけるバルブユニットの少なくとも一方は、シール部材から接続端面側に至る前記突当棒と前記シリンドリカルケースとの間における空間が、ほとんど隙間を形成しない状態となるように構成されていることが好ましい。

【0013】また、前記シリンドリカルケース内における突当棒が、ケースの軸心方向に突出する少なくとも3個のフィン状部材により軸方向に揺動できるように支持され、前記各フィン状部材の間にインク流路を形成するように構成することが好ましく、また好ましくは前記バルブユニットの少なくとも一方における突当棒が当接されるシール部材がバルブユニットの端面側に一体に延出され、バルブユニットの両者の接続状態において端面側に延出された前記シール部材によって、それぞれのバルブユニットの端面がシールされるように構成される。

【0014】さらに、少なくとも一方における接続端面にシール部材が配置され、バルブユニットの両者を接続する状態において、前記接続端面に配置されたシール部材によって外気との間でシールされた後、バルブユニットの両者におけるそれぞれの突当棒が移動してインクの流通を可能とする構成も好適に採用し得る。

【0015】以上の構成によると、前記接続機構を介して記録ヘッド側にインクを供給することができ、特にサブタンクを備えインク供給ステージにおいて、サブタンクに対してインクを供給するように構成した記録装置に採用した場合においては、従来のようにインクタンクからサブタンクに連結するインク供給チューブを排除することができる。

【0016】そして、接続機構は両者の接続状態においてインクの流通を可能とし、両者が分離された状態において、両者の接続部においてそれぞれインク供給路が閉塞される構成とされているので、両者の分離状態において接続部よりインクが漏出するのを防止させることができると共に、接続部より大気が逆流するのを防止させることもできる。

【0017】

【発明の実施の形態】以下、本発明にかかるインクジェット式記録装置について、図に示す実施の形態に基づいて説明する。図1は、本発明が適用されたインクジェ

ト式記録装置におけるサブタンクと、サブタンク側の接続機構の構成を断面図によって示したものである。サブタンク 1 とその上部に取り付けられた接続機構 2 は、後述する記録ヘッドと共にキャリッジに搭載されており、記録用紙（図示せず）の幅方向に往復駆動されるように構成されている。そして、前記接続機構 2 を介してインクタンクからインクの供給を受けると共に前記記録ヘッドにインクを供給することができるように構成されている。

【0018】図 1 の下半部に示すサブタンク 1 は、上部が開口されたケース 1 a と、その上部を閉塞する蓋体 1 b とにより構成されており、これらは例えば超音波溶着または振動溶着等の手段によって結合され、これにより内部が密閉されたインク貯留室 1 c を形成している。そして、このサブタンク 1 内には、サブタンク内に貯留されたインクによって浮上するフロート部材 3 が配置されている。このフロート部材 3 は、このフロート部材に一体に形成された支持軸 4 を回転中心として重力方向に上下に可動できるように構成されている。

【0019】また、サブタンク 1 の上部には、シール部材 5 が配置されており、このシール部材 5 は、サブタンク 1 内へ充填されたインクによって浮上して、サブタンク 1 の上部に配置されたエアバルブを構成するバルブ部材 6 に当接することにより、後述する負圧発生手段としての減圧ポンプに通ずる吸引路を閉塞できるように構成されている。

【0020】また、サブタンク 1 には、上半部に示す接続機構 2 を介して後述するインクタンクからインクの供給を受けるインク補給口 7 が配置されており、サブタンク 1 には、接続機構 2 を介して後述する記録ヘッドに対してインクを供給するインク供給口 8 も配備されている。さらにサブタンク 1 の上部には、空気導入口 9 が配置されており、印字に伴うインクの消費に対応してこの空気導入口 9 から空気が導入できるように構成されている。

【0021】なお、図 1 においては 1 つのサブタンクについての構成が示されているが、これは扱われる各インクに対応して紙面上垂直方向に複数（この実施の形態においては 6 個）の同一構成のサブタンクが併設された状態になされている。

【0022】一方、接続機構 2 にはバルブ部材 6 に連通する吸引空間（以下吸引口とも言う）10 を介して減圧ポンプ側に接続される共通のバルブユニット 11 が配置されている。前記吸引空間 10 は紙面上垂直方向に、各サブタンクにそれぞれ対応して横断的に連通して形成されており、したがって吸引空間 10 は共通のバルブユニット 11 を介して、インク供給ステージに配置された後述する他の接続機構に接続できるように構成されている。なお、前記バルブユニット 11 はインク供給ステージに配置された他の接続機構と接続される場合におい

て、開弁されるように構成されている。

【0023】また、前記接続機構 2 内にはインク補給口 7 にインクを送り込む補給空間 12 が、それぞれのサブタンク 1 に対応させて個別に形成されており、各補給空間 12 に配置されたバルブユニット 13 を介して、インク供給ステージに配置された後述する他の接続機構に接続できるように構成されている。なお、前記各バルブユニット 13 においても、インク供給ステージに配置された他の接続機構と接続される場合において開弁されるように構成されている。

【0024】接続機構 2 内にはインク供給口 8 から記録ヘッドに至るインク供給路において、開閉制御されるインク供給バルブ 14 がそれぞれのサブタンクに対応させて個別に配置されている。さらに、接続機構 2 内には前記した空気導入口 9 に対向して開閉される空気導入バルブ 15 が、それぞれのサブタンクに対応させて個別に配置されており、空気導入バルブ 15 を介した空気導入空間 16 は、横断的に連通して形成されており、図 1 には示されていないが、空気導入空間 16 の一部は大気開放されている。

【0025】前記サブタンク 1 と接続機構 2 との間においては、例えばインク供給口 8 部分の構成で示すようにサブタンク 1 側から一体に延出する接続管 17 が、接続機構 2 側に形成された凹陥部 18 に配置された円環状の可換性シール部材 19 に圧入するようにして接続されている。この構成は前記したインク補給口 7 部分、バルブ部材 6 部分、および空気導入口 9 部分においても同様に構成されている。

【0026】そして、図 1 に示す実施の形態においては、サブタンク 1 の一方の側壁に突設された突起 20 が、接続機構 2 に形成された係合孔 21 に入り込み、一方、サブタンク 1 の他方の側壁に形成された突起 22 に、接続機構 2 に形成された係合爪 23 が乗り越えるようにして両者が一体に結合されている。

【0027】図 2 は、インクタンクとしてのインクカートリッジから、前記したサブタンクを介して記録ヘッドにインクを供給する 1 つのインク供給系統の基本構成を模式図によって示したものである。なお図 2 においては、図 1 に示すサブタンク側の接続機構 2 と、この接続機構に接続される後述するインク供給ステージにおける接続機構は省略して示している。

【0028】図 2 における符号 31 はインクタンクを示しており、このインクタンク 31 は、記録装置の例えば両側面に配置されたカートリッジホルダに装填される。そしてインク供給路 32 を介してキャリッジに搭載されたサブタンク 1 にインクを供給するように構成されている。また、図 1 も示したとおり、サブタンク 1 からはインク供給バルブ 14 を介して記録ヘッド 33 にインクを供給するように構成されており、さらにまたサブタンク 1 は、内部に配置されたバルブ部材 6 に連通する共通

の吸引路 3 4 を介して負圧発生手段としての減圧ポンプ 3 5 に接続されている。

【0029】なお図 2 に模式的に示すように、この構成においてはインクタンク 3 1 のインク導出部 3 1 a が、前記サブタンクに配置されたインク補給口 7 に対して重力方向において若干低い位置、換言すれば前記インク補給口 7 においてわずかに負圧となるように両者が配置されている。このような構成によりインク供給ステージに配置された接続機構においてインクの漏出を確実に阻止させることができる。

【0030】次に図 3 は、インクタンク 3 1 とサブタンク 1 との間に介在する接続機構の構成を示したものである。この図 3 には 6 個のサブタンク 1 とそれぞれに配置されたサブタンク側の接続機構と、インク供給ステージに配置されたインク供給側の接続機構 4 1 が描かれている。すなわち、この図 3 は図 1 に対して直交する方向から見た状態を示している。

【0031】インク供給側の接続機構 4 1 は、ガイドケース 4 2 に内向きに配置された 4 本のガイド突起 4 3 によって上下方向に移動できるように構成されており、この接続機構 4 1 は図には示されていないがモータ等のアクチュエータの駆動によって上下に所定の範囲で移動される。接続機構 4 1 の上部部には、接続開口部 4 4 が形成されており、この接続開口部 4 4 には 6 色の各インクが貯留されたそれぞれのインクタンク 3 1 に一端が接続されたインク供給路 3 2 の他端が接続される。そして接続機構 4 1 の各下部部には、図 4 以降において説明するバルブユニット 5 1 が配置されている。

【0032】一方、各サブタンク 1 側においても図 1 において説明したように接続機構 2 がそれぞれ配置されており、これらの接続機構 2 における上部部においても図 4 以降において説明するバルブユニット 1 3 が配置されている。

【0033】図 4 乃至図 6 は、前記したインク供給ステージに配置された接続機構 4 1 におけるバルブユニットと、サブタンク 1 側に配置されたバルブユニットの第 1 の実施の形態を断面図で示したものである。なお、図 4 はバルブユニットの両者が分離されている状態を、図 5 は両者が接続されている状態を、また図 6 (A) および (B) は図 5 における A-A 線および B-B 線において、それぞれ矢印方向に視た断面図を示している。

【0034】まず、インク供給ステージ側のバルブユニット 5 1 は、その外郭を第 1 と第 2 のシリンダ状ケース 5 2、5 3 を軸方向に接合することで形成されており、両者の間には O リング 5 4 が配置され、その接合部を気密状態としている。そして図中上端部に形成された開口 5 5 が前記接続機構 4 1 を介してインクタンク 3 1 に連通するようになっている。

【0035】前記シリンダ状ケース 5 2、5 3 の軸心部には接続端面側に凸部 5 6 a を形成した突当棒 5 6 が軸

方向に摺動可能に配置されており、突当棒 5 6 に形成された銼部と第 2 ケース 5 3 との間に配置されたコイルバネ 5 7 によって、突当棒 5 6 の凸部 5 6 a が接続端面側(図中下方向)に突出するように付勢されている。

【0036】前記突当棒 5 6 の一部にはテーパー部 5 6 b が形成されており、この突当棒 5 6 の突出状態において、シール部材 5 8 に対してテーパー部 5 6 b の斜面が当接されるように構成されている。したがって、図 4 に示す状態においては突当棒 5 6 のテーパー部 5 6 b が、その斜面においてシール部材 5 8 に対して当接し、充分な機密性を確保することができる。

【0037】また、前記シール部材 5 8 の一部は、端面側に一体に延出されており、図 5 に示すバルブユニットの両者の接続状態において端面側の延出部 5 8 a によって、それぞれのバルブユニットの端面がシールされるように構成されている。このような共用した構成によってシール部材 5 8 の部品点数を 1 つとすることができる。

【0038】一方、サブタンク側のバルブユニット 1 3 においても、その外郭を第 1 と第 2 のシリンダ状ケース 6 1、6 2 を軸方向に接合することで形成されており、両者の間には O リング 6 3 が配置され、その接合部を気密状態としている。そして図中下端部に形成された開口 6 4 がサブタンク側に連通されている。

【0039】前記シリンダ状ケース 6 1、6 2 の軸心部には接続端面側に凸部 6 5 a を形成した突当棒 6 5 が軸方向に摺動可能に配置されており、突当棒 6 5 に形成された銼部と第 2 ケース 6 2 との間に配置されたコイルバネ 6 6 によって、突当棒 6 5 の凸部 6 5 a が接続端面側(図中上方向)に突出するように付勢されている。また、前記突当棒 6 5 に形成された銼部には環状に形成され平板状のシール部材 6 7 が取り付けられており、前記コイルバネ 6 6 の付勢力によってシール部材 6 7 がシリンダ状ケース 6 1 の内壁面に当接して機密性を確保するように構成されている。

【0040】さらに図 4 に示す突当棒 6 5 の突出状態においては、シール部材 6 7 から接続端面に至る前記突当棒 6 5 とシリンダ状ケース 6 1 との間における空間が、ほとんど隙間を形成しない状態となるように構成されている。このように構成することにより、互いのバルブユニットが分離された状態において、バルブユニットの接続端面におけるインクの残留量を可及的に少なくすることができ、残留インクにより装置内を汚染させるという問題を除去することができる。

【0041】図 5 は前記したバルブユニット 5 1 およびバルブユニット 1 3 の両者が接続されている状態を示しており、これには両者に配置されたコイルバネ 5 7 および 6 6 のバネ力がほぼ均衡していることが望ましい。両者のバネ力がほぼ均衡していることによって、各突当棒 5 6、6 5 は、ほぼ同時にかつ同程度の移動量をもって移動し、互いの間にインクの流路が形成される。

【0042】一方、図5におけるA-A断面である図6(A)で示したように、バルブユニット51における突当棒56の跨部と、ケース52との間には跨部の周方向に3か所の突起56cを形成させることで、軸方向に摺動できるように支持されており、これによりインク流路を形成させている。また図5におけるB-B断面である図6(B)で示したように、突当棒56はケースの軸心方向に突出する4個のフィン状部材52aにより軸方向に摺動できるように支持され、これによりインク流路を形成させている。

【0043】なお、この実施の形態においては、4個のフィン状部材52aを形成しているが、これは少なくとも3個以上形成させることで、突当棒56を軸心位置に保持することができる。また、この図6に示す形態は、サブタンク側のバルブユニット13においても採用し得る。そして、インク供給ステージ側に配置されるバルブユニット51、およびサブタンク側に配置されるバルブユニット13は、相互に入れ替えても、支障なく使用することができる。

【0044】以上のように構成された各バルブユニット51、13の組み合わせによる、互いの接合に際しては、まず各突当棒56、65に形成された各凸部56a、65aが接合して、各突当棒56、65が互いにシリンダ状ケース52、61内に押し込むようになされる。そして、なお両者が接近することで、一方のシリンダ状ケース52の端面側に配置されたシール部材58の延出部58aが、他方のシリンダ状ケース61の端面に当接して両者は接合され、前記シール部材58の延出部58aによって両者は気密状態にシールされ、両者間にインク供給路が形成される。

【0045】ここで、前記した第1の実施の形態においては、シール部材58の延出部58aによって両者間のシールがとられない以前において、各バルブユニット51、13は開弁状態となり、インクは両者の接合状態から分離する途中においても同様の状態が発生する。

【0046】しかしながら、図2において説明したようにインクタンク31のインク補給部31aの位置が、バルブユニット51の位置に対して重力方向において若干低い位置となる配置構成を採ることにより、特にインクタンク31側のバルブユニット51は、開弁状態においてわずかな負圧状態となり、インクが漏出する不都合を回避させることができる。ただし、バルブユニット51からインクタンク31側に対して、空気が逆流するおそれもあるため、前記負圧の程度ができる限り小さくするようにインクタンク31との位置関係を調整することが望ましく、さらにインク供給ステージにおける接続機構41の移動動作を迅速に行うように構成することで、前記した不都合を回避させることができる。

【0047】次に図7および図8は、各バルブユニットの第2および第3の実施の形態を断面図で示したもので

ある。なお、図7に示す第2の実施の形態においてはバルブユニットの両者が接続されている状態を示しており、また図8に示す第3の実施の形態においてはバルブユニットの両者が分離されている状態を示している。そして、図4乃至図6に示した第1の実施の形態に相当する部分は、同一符号で示しており、したがって図7および図8に示した両者の特徴点について説明する。

【0048】すなわち、図7および図8に示した第2および第3の実施の形態においては、シリンダ状ケース61の外側にさらにリング部材68が配置されており、このリング部材68によって、他方のシリンダ状ケース52に当接するリング69を保持している。そして、バルブユニットの両者51、13を接続する状態において、バルブユニット13の接続端面に配置されたリング69によって外気との間でシールさせた後、バルブユニットの両者51、13におけるそれぞれの突当棒56、65が移動してインクの流通が可能となるように構成されている。

【0049】特に、図8に示す第3の実施の形態においては、シリンダ状ケース61と前記リング部材68との間にコイルバネ70がさらに配置され、リング69が接続端面の方向に付勢されるように構成されている。したがってこの構成によると、バルブユニットの両者51、13を接続する際に、コイルバネ70の付勢力とリング69の弾性力とによって、他方のバルブユニット51の端面に当接して外気との間でシールがなされ、その後にバルブユニットの両者51、13におけるそれぞれの突当棒56、65が移動してインクの流通が可能となるようにされる。

【0050】以上説明した構成において、印刷動作の継続により図1に示すサブタンク1内のインク量が減少してインクエンド状態となると、前記フロート部材3は軸4を介して沈下した状態となされる。そこでキャリッジはインク供給ステージに移動して、図3に示すようにサブタンク側の接続機構2と、インク供給ステージに配置されたインク供給側の接続機構41とが接続される。

【0051】また、図3には示されていないが、同様の接続機構を介してバルブ部材6の吸引口が減圧ポンプ35に通ずる吸引路34に接続される。また、この状態においては、サブタンク1から記録ヘッド33に至るインク供給バルブ14は閉弁状態となされ、また前記した空気導入バルブ15も閉弁状態とされる。

【0052】これにより、図4以降に示した各バルブユニット51、13の突当棒56、65が移動してインクの流通が可能な状態となる。一方、フロート部材3に配置されたシール部材5はバルブ部材6から離れた状態となっているため、減圧ポンプ35の動作によりサブタンク1内は減圧状態とされる。したがって、インクタンク31より前記バルブユニット51、13を介してサブタンク7内にインクが補給される。

【0053】このようにして、インクタンク31よりサブタンク1内にインクが補給され、サブタンク1内のインクがほぼ満タンとなった場合には、前記フロート部材3がインクによって浮上し、これに伴って前記シール部材5はバルブ部材6に当接してエアバルブを開弁状態とする。この時、シール部材5は減圧ポンプ35に吸引されてバルブ部材6に密着した状態となり、サブタンク1内の減圧は停止される。したがってインクタンク31からサブタンク1内へのインクの補給も停止される。

【0054】そして、全てのサブタンクにおいてインクが充填された時点で、インク供給ステージに配置された接続機構41とサブタンクに配置された接続機構2との結合が解かれる。これにより、インク供給ステージに配置された接続機構41とサブタンクに配置された接続機構2にそれぞれ配置されたバルブユニット51、13は分離される。したがって、前記したように各バルブユニット51、13に配置された各突当棒56、65は各コイルバネ57、66の付勢力によって元の状態に戻され、各バルブユニット51、13におけるインク供給路は閉塞される。

【0055】これにより、バルブユニット51、13における接続端部よりインクが漏出する現象を阻止することができる。そして、この状態でサブタンク1から記録ヘッド33に至るインク供給バルブ14は開弁状態となされ、また前記した空気導入バルブ15も開弁状態とされ、記録ヘッド33による印字が開始される。

【0056】このようにして、記録ヘッド33による印字動作が実行され、これによりサブタンク1におけるインクが減少した場合には、インク供給ステージにおいて前記と同様な作用によってインクの補給がなされ、再び記録ヘッド33による印字動作が実行される。

【0057】

【発明の効果】以上の説明で明らかなように、本発明にかかるインクジェット式記録装置によると、インクタンクから記録ヘッドに至るインク供給路において、接離可能に構成され両者の接続状態においてインクの流通を可能とし、両者が分離された状態において両者の接続部において、それぞれインク供給路が閉塞されるバルブユニットを備えた接続機構を具備しているため、両者の分離状態において接続部よりインクが漏出するのを防止させることができ、また接続部より空気が逆流することも防止することができる。

【0058】そして、特にキャリッジに搭載されるサブタンクを備え、インク供給ステージにおいてサブタンクに対してインクを供給するように構成した記録装置にこれを採用した場合においては、従来のようにインクタンクからサブタンクに連結するインク供給チューブを排除することができ、記録装置としての構成を簡素化させることに寄与できる。

【図面の簡単な説明】

【図1】本発明を適用したインクジェット式記録装置におけるサブタンクと接続機構との構成を示した断面図である。

【図2】インクタンクから記録ヘッドに至るインク供給系統の構成を示した模式図である。

【図3】インク供給ステージに配置された接続機構の構成を示した側面図である。

【図4】接続機構に配置されるバルブユニットの第1の実施の形態を示した断面図である。

【図5】同じくバルブユニットが接続された状態を示す断面図である。

【図6】図5におけるA-A線ならびにB-B線より矢印方向に視たバルブユニットの断面図である。

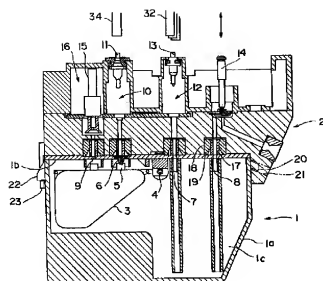
【図7】接続機構に配置されるバルブユニットの第2の実施の形態を示した断面図である。

【図8】接続機構に配置されるバルブユニットの第3の実施の形態を示した断面図である。

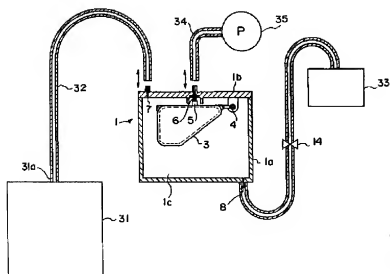
【符号の説明】

| | |
|------|----------------|
| 1 | サブタンク |
| 2 | 接続機構 |
| 3 | フロート部材 |
| 5 | シール部材 |
| 6 | バルブ部材 (エアバルブ) |
| 7 | インク補給口 |
| 8 | インク供給口 |
| 9 | 空気導入口 |
| 10 | 吸引空間 (吸引口) |
| 13 | バルブユニット |
| 14 | インク供給バルブ |
| 15 | 空気導入バルブ |
| 31 | インクタンク |
| 32 | インク供給路 |
| 33 | 記録ヘッド |
| 34 | 吸引路 |
| 35 | 減圧ポンプ (負圧発生手段) |
| 41 | 接続機構 |
| 51 | バルブユニット |
| 52 | 第1ケース |
| 52 a | フィン状部材 |
| 53 | 第2ケース |
| 56 | 突当棒 |
| 56 a | 凸部 |
| 56 b | テーパ部 |
| 57 | コイルバネ |
| 58 | シール部材 |
| 61 | 第1ケース |
| 62 | 第2ケース |
| 65 | 突当棒 |
| 65 a | 凸部 |
| 66 | コイルバネ |

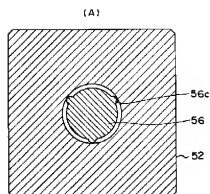
【図1】



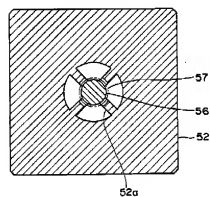
【図2】



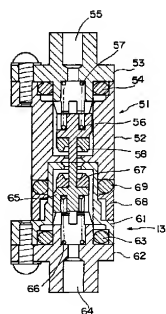
【図6】



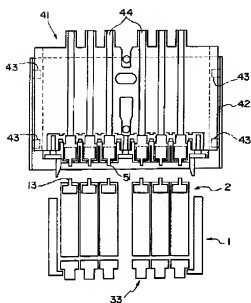
(B)



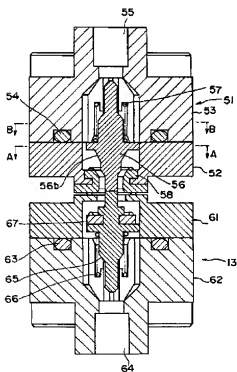
【図7】



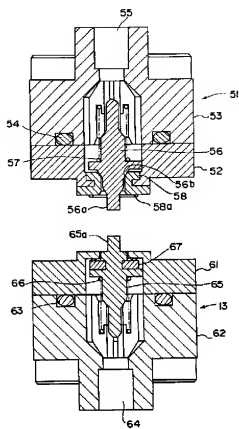
【図3】



【図5】



【図4】



【図8】

